Tracking to Retain Higher-Income Students: Evidence from the Addition of Advanced Courses *

Farah Mallah

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Abstract

Public schools may introduce academic tracks to attract or retain upper-income and high-achieving students. I exploit variation in the timing of a school's first advanced course addition across subjects and find that offering an advanced course increases lower-income students' share of upper-income classmates. The increase is driven by a rise in the overall share of upper-income students at the school, which offsets increased within-school sorting by income. These results provide new insight into how academic tracking intersects with school choice, revealing potential unintended benefits for socioeconomic integration.

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1 Introduction

Recent research has established a strong relationship between cross-income friendships in neighborhoods and economic mobility (Chetty et al., 2022). In my work, I found that lower-income students in high school cohorts with a higher share of upper-income peers were more likely to enroll in college and earn higher wages in early adulthood (Mallah, 2024). Independent of economic outcomes, cross-group interactions may also be important for social cohesion (Corno, La Ferrara,and Burns, 2022; Rao, 2019; Carrell, Hoekstra, and West, 2019).

How schools are organized could facilitate or hinder friendships between lower- and upper-income students. For instance, schools may inadvertently deepen inequalities by creating categories—such as gifted programs—that sort students by income (Kerckhoff, 1995; Domina, Penner, and Penner, 2017). While previous studies have explored the effects of school choice policies on segregation (see Phillips et al., 2015; Marcotte and Dalane, 2019; Alcaino and Jennings, 2020; Monarrez, Kisida, and Chingos, 2022), we know far less about how specific school factors, such as course offerings, influence cross-income exposure.

One common policy lever in schools is the choice of courses to offer. The equity implication of tracking through the addition of advanced courses is particularly salient in policy discussions.[1] The assumption underlying many of the news headlines is that advanced courses would create separate tracks that increase economic segregation in schools—reinforcing existing inequities. This between-classroom sorting mechanism is usually the center of policy debates about tracking. Those debates typically ignore the potential between-school sorting following the addition or removal of an advanced course. For example, higher-income students may elect to leave public schools when advanced courses are removed. While some research has addressed the impact of advanced courses on college enrollment (Jackson, 2014; Cohodes, 2020; Conger, Long, and McGhee Jr., 2020; Huynh and Zhu, 2025), these studies overlook the potentially mediating effect of advanced courses on exposure to higher-income and higher-achieving students.

I test the hypothesis that schools may track to retain or attract higher-achieving and/or upper-

1. Recent news articles: https://www.bostonglobe.com/2023/07/14/metro/cambridge-schools-divided-over-middle-school-math/; https://www.baronnews.com/2023/03/21/some-california-high-schools-remove-honors-classes-due-to-equity-issues/; https://www.virginiamercury.com/2021/04/26/virginia-isnt-eliminating-accelerated-math-courses-but-its-one-of-many-states-rethinking-math-education/

income students by presenting evidence on the impact of the addition of advanced courses on lower-income students' classroom income and achievement composition. Domina et al. (2017) observe that schools with more advantaged student populations tend to increase tracking in response to policy pressures. Epple, Newlon, and Romano (2002) present a theoretical model in which public schools track to retain higher-achieving upper-income students.

The change in lower-income students' classroom composition may arise from two opposing mechanisms: 1) the addition of an advanced course might alter the share of upper-income students enrolled in the school (a "composition shift"). Higher-income students might be less inclined to transfer to private schools and more likely to enroll in schools when advanced courses are available. 2) it might increase income-based sorting between classrooms in a school (a "sorting change"). Increased income-based sorting following the addition of an advanced course would happen if lower-income students are less likely to enroll in an advanced course compared to the counterfactual course. Lower-income student's lower likelihood of enrolling in advanced courses may be explained by differences in parental involvement (see Kalgorides and Loeb, 2013; Lareau, 1987; Lareau, 2000; Useem, 1992; Barg, 2012) or differences in academic preparation.

A concern with evaluating the impact of the addition of advanced courses is selection. Schools might introduce new courses for various reasons reflecting changes in the student populations (demand-side factors) or administrative priorities and teacher experience (supply-side factors). While demand and/or supply changes may determine course offerings, the precise timing of an advanced course's introduction may be quasi-random. To isolate the impact of adding an advanced course, I utilize a difference-in-differences approach, leveraging variations in the timing of the first advanced course addition to a subject area within a school between 2004 and 2022 in Texas Schools. The assumption necessary for establishing a causal link is that treatment and comparison schools would have followed similar trends in lower-income students' share of upper-income students in the absence of the advanced course addition. Consistent with this assumption, I find no evidence of pre-existing trends in the share of upper-income classmates in lower-income students' classrooms prior to the introduction of AP courses in a school subject, suggesting that the observed effects are indeed attributable to the new coursework.

I use data from the Texas Education Research Center (2004-2022) which includes information on student test scores, course enrollments (and class assignments starting in 2011) and teacher assigned. To capture student income, ideally, I would have parental income for all enrolled students. In the absence of this, I measure economic disadvantage using the share of years each student is in on free/reduced lunch status.[2] I categorize students into three income groups: those who are always, sometimes, or never eligible for free/reduced lunch. This classification effectively captures variations in parental income, with financial aid reported average adjusted parental incomes of $141,686 for those never eligible, $51,406 for those sometimes eligible, and $27,305 for those always eligible (Mallah, 2024).[3] I refer to to the "never eligible" group as "higher/upper-income" (24% of students) and the "always eligible" group as "lower income" (29% of students).

My primary outcome of interest is the share of upper-income students in lower-income students' classrooms. In this paper, I focus on the impact of adding AP courses, as they represent the majority of advanced offerings. I define treatment as the first addition of an AP course in a high school subject area (e.g., sciences), while control schools are those where an AP course is never added in that same subject area (e.g., sciences) between 2004 and 2022.[4]

My findings indicate that the addition of an AP course increases lower-income students' exposure to higher-income classmates. Specifically, I observe a 1 percentage point (9%) increase in lower-income students' share of upper-income peers ($p < 0.001$). A 1 percentage point increase in exposure to upper-income students is about one-third the average potential gain in exposure to upper-income students had students been randomly assigned to schools in a district (Mallah, 2024). This is counterintuitive, if we assume that the only mechanism by which the addition of advanced courses may impact lower-income students' classroom exposure to upper-income peers is by changing student sorting within schools. The positive impact on socioeconomic integration coupled with Jackson (2014) and Huynh and Zhu (2025) finding that incentivizing AP course enrollment increases students' college enrollment and wages suggests that advanced courses may improve school socioeconomic integration and equity in long-term outcomes.

2. To identify the proportion of years on free/reduced lunch, I use all years from 2004 to 2022. This definition of economic disadvantage builds on Michelmore and Dynarski (2017), who find that the number of years on free/reduced lunch captures student economic disadvantage better than a binary measure of economic disadvantage based on one year of free/reduced lunch eligibility status.

3. Their median parental income is $117,119, $39,145 and $22,000, respectively. The median income in Texas based on census data (2019-23) is around $76,290 (Census, 2023).

4. I exclude school subject areas that at any point before 2012 had an AP course (always-treated). Once an AP course is added, a school subject area is considered treated for the remainder of the years.

I find evidence for the two counter mechanisms ("composition shift" and "sorting change"). Following the introduction of an AP course, the share of higher-income students in treated subjects rose by 1.1 percentage points. However, I also observed an increase in income sorting. The difference in the share of upper-income classmates in the treated subject area between upper- and lower-income students increased by 0.5 percentage points. Evidence for both mechanisms suggests the increase in sorting by income within schools was countered by the increase in the share of upper-income students in the school.

The relationship between AP coursework and exposure to higher-income students may vary by subject area. For example, in subjects like math, where enrollment in an AP course might highly depend on prior preparation, lower-income students may be less likely to benefit from the addition of an AP course. My findings indicate that the increase in exposure to upper-income peers primarily occurs in four subject areas: science, foreign language, technology and fine arts, with no evidence of an effect in math.

I find that the addition of an AP course increases the share of upper-income students in the district, with no detectable impact on other schools within the district, suggesting the increase in share of upper-income students is driven by higher-income students who would have otherwise attended private schools or public schools in other districts. The findings align with Epple, Newlon, and Romano (2002) prediction that school tracking could attract higher-income students to public schools. However, while their model predicts that this increase would primarily involve higher-income, higher-achieving students, my results indicate a different pattern. Specifically, the increase in the share of upper-income students appears to be driven by higher-income students who scored below the 75th percentile on their grade 8 tests.

These findings highlight the importance of considering not only how course offerings affect student sorting within schools but also how they influence overall school composition by attracting and retaining higher-income students. The identification strategy employed also provides a framework for examining how various course offerings impact student demographics and long-term outcomes, enabling schools to make more informed decisions about which courses to offer and to whom.

There may be other subject and school changes happening alongside the addition of an AP course. For instance, a school might hire more experienced teachers who improve instructional quality, and these teachers may also be more likely to introduce an AP course. In such cases, the observed impacts could be driven by improved teacher quality rather than the AP course itself. I find similar estimates when including teacher fixed effects, nevertheless, there may be other factors which we do not observe in the data. Therefore, the estimates are best interpreted as suggesting that the typical package of changes that happen alongside AP course addition do not decrease lower-income students' exposure to upper-income classmates, instead, they increase their share of upper-income classmates.

This paper contributes to the literature on advanced coursework and tracking. There are a few papers on the impact of advanced coursework on students' college enrollment (Jackson, 2014; Cohodes, 2020; Conger, Long and McGhee Jr., 2020; Owens, 2024; Huynh and Zhu, 2025). These papers do not examine the (potentially) mediating impact on exposure to higher-income students—namely, how course offerings may change classroom and school composition. By using variation in the timing of the introduction of a new type of course in a school subject, I also offer a strategy by which the impact of other school course offerings could be evaluated.

The findings also contribute to the literature on school tracking. Prior work provides evidence of within-school by academic performance, race and income (e.g., Antonovics, Black, Cullen, and Meiselman, 2022; Clotfelter, Ladd, Clifton, and Turaeva, 2021; Dalane and Marcotte, 2022; Clotfelter, Ladd, and Vidgor, 2002). While it is known that sorting within schools occurs, it is unclear how school course offerings impact the level of sorting within schools and lower-income students' exposure to upper-income peers. Antonovics et al. (2022) find that Texas middle schools with more curricular differentiation, measured by the number of math courses offered, tend to have higher levels of sorting by test scores. However, the higher level of within school sorting may be driven by factors correlated with the number of math courses offered in a school, like changes in the share of upper-income and/or higher-achieving students. The literature on school tracking also does not take into account the potential impact of differentiated courses on parent's choice of which school to enroll their kids in, and in turn the schools' income composition. Therefore, the overall effect on lower-income students' exposure to upper-income classmates remains unclear; tracking may simultaneously raise the proportion of upper-income students in the school by making the school more attractive to higher income households. I use variation in the timing of an advanced course's introduction in a subject within a school to address selection concerns. I document the impact of adding an advanced course on the composition of the subject and school, as well as the rate of income-based sorting to capture the overall effect on socioeconomic integration.

The paper is organized as follows. Section 2 presents the data used and context. Section 3 presents the identification strategy. Section 4 examines supply and demand side factors that may contribute to the addition of an AP course. Section 5 reports the main findings and section 6 concludes the paper.

2 Data and Context

I use longitudinal administrative data from Texas Education Agency (TEA). These TEA data span from 2004 to 2022, covering student test scores, course enrollments (including class assignments from 2011 onward), demographics, attendance, graduation, and teacher assignments (including teacher certification and demographic information).[5]

To approximate student income levels, I use the proportion of years a student is eligible for free/reduced-price lunch as a measure of economic disadvantage.[6] Students are categorized into three income groups: always, sometimes, and never eligible for free/reduced-price lunch.

The categorization based on years in free/reduced lunch status effectively captures variation in parental income, as indicated in previous research (Michelmore and Dynarski, 2017; Mallah, 2024). Students who applied for financial aid for college have to report their parental gross income. Among students who applied for financial aid, average parental income for those who are never, sometimes, and always eligible for free/reduced lunch is \$141,686, \$51,406, and \$27,305, respectively, with median incomes of \$117,119, \$39,145, and \$22,000.[7] For simplicity, I refer to students who are never on free/reduced lunch as higher- or upper-income students, and those always on free/reduced lunch as lower-income students. In this paper I focus on lower-income students since we are motivated by

5. Test scores are primarily based on standardized grade 4 and 8 TAKS (2007–2011) and STAAR (2012–2018) reading and math tests. In this version of the paper I will not use the college enrollment and wage data and will only focus on the impact on cross-income exposure.

6. This calculation uses data from all available years, 2004 to 2022.

7. These averages represent students with financial aid data—a select group of students—and may be upper bounds for those always on free/reduced lunch. Financial aid data are available for 52%, 35%, and 30% of students in the never, sometimes, and always eligible groups, respectively.

the relationship between cross-income friendships and economic mobility, and how school policies may impact lower-income students' exposure to higher-income peers.

In Texas high schools, students take an average of eight courses per year. They typically enroll in advanced courses during grades 11 and 12, averaging 1 and 1.6 advanced courses, respectively, per grade, as shown in Table A1. The largest advanced course category (around half of all advanced courses) are Advanced Placement (AP) courses.[8]

Schools offer an average of 97 courses per academic year, including approximately 13 advanced courses, of which 7 are typically AP courses as shown in Table A4. I focus on AP courses, as they are the largest category of advanced courses and make up more than half of advanced courses. Courses are classified into 10 main subject areas: English Language Arts (ELA), Mathematics, Science, Social Studies, Foreign Language, Fine Arts, Technology Application, Physical Education and Health, Business Education, and Career and Technical Education (CTE). Advanced courses are generally offered in the first seven subject areas.[9]

3 Identification Strategy

To evaluate the impact of introducing an advanced course in a given subject area, I exploit variation in the timing of the initial addition of an advanced course across schools and subject areas. The core assumption of this difference-in-differences design is that the exact timing of a school's adoption of an advanced course in a subject area is as good as random.

Consider, for example, School A, which introduced an Environmental Systems AP course in 2014 after previously offering no AP science courses, while the comparison school, School B, did not offer any advanced science courses between 2011 and 2022. The impact of adding the AP course in 2014 is estimated by comparing the change in lower-income students' share of upper-income classmates in School A after 2014, relative to the change in School B over the same period (2014-2022). For this difference to capture the effect of adding the AP course, it must hold that, absent the AP course, trends in exposure to upper-income students would have been similar across Schools A and

8. Students also take around two dual-credit courses in grades 11 and 12; however, most dual-credit courses are not classified as advanced by Texas state standards.

9. The median number of courses offered in a school year is 71 courses, including a median of approximately 6 advanced courses.

B. This assumption is more plausible if Schools A and B had similar trends in exposure before the AP course was added in School A (i.e., 2011-2013).

In line with this example, I define treatment as the first-time addition of an AP course in a high school's subject area. First, I identify AP course offerings across subjects from 2004 to 2022. I focus on schools that add an AP course after 2011 because I only have classroom-level data starting in 2011—38% of high schools in Texas add an AP course for the first time between 2011 and 2022 in at least one subject area. I include seven subject areas where AP courses may be introduced: social studies, English language arts, science, math, foreign language, fine arts, and technology.[10] In a given subject area, the share of schools that add an AP course for the first time in that subject between 2011 and 2022 ranges from 7% in English language arts, math and social studies to 16% in technology. Control (or comparison) school subject areas are defined as those in which no AP course was added during the observation period (2004-2022). I exclude any school subject areas that offered an AP course before 2012 (always-treated).

Once a subject area within a school adds an AP course, it is considered treated in all subsequent years. The sample covers 4,635 school-subject areas across 1,339 schools, with 890 school-subject areas treated. The primary analysis is conducted at the student subject-area level, observing each student once in a subject-area per year. This framework is represented in Equation 1:

$$Prophighincome_{isat(-i)} = \sum_{t=-11}^{10} \beta_t AdvancedSection_{sat} + \delta_{ay} + \delta_{at} + \delta_{sa} + \epsilon_{isat} \tag{1}$$

where β_t captures the impact of adding an advanced course to subject area a in school s on lower-income students' exposure to upper-income classmates. $AdvancedSection_{sat}$ equals 1 from the year t that an AP course is introduced in the subject area, with all subsequent years considered treated. The primary outcome, $Prophighincome_{isat(-i)}$, is defined as the proportion of upper-income students in the classrooms of student i in subject area a of school s in year t, excluding student i's own income status.[11] Equation 1 is estimated separately for upper- and lower-income students to assess differential impacts on each group's exposure to upper-income peers.

10. The most taken course in the technology subject area is computer science. Other technology courses include web design, animation and robotics.

11. I also look at share of total classmates that are upper-income across subjects in student i's school.

The model includes subject-year fixed effects, δ_{at}, which control for any time-varying changes in the proportion of upper-income students within a subject area, serving as the standard time fixed effect in a difference-in-difference model. I also incorporate school-subject fixed effects, δ_{sa}, to capture baseline differences in exposure to upper-income student in a school subject. Standard error estimates are clustered at the school level.

As shown in Figure 1 panel (b) about 20% of schools that added an AP course added the course in their second year of operation. Because new schools are likely to be experiencing multiple changes in their first years of operation, in my main specification I control for number of years school has been open since 2004 (δ_{ay}). I also run the main analysis on a subset of schools that are more established—have been open for four or more years by 2011—as a robustness check.

To identify β_t from Equation 1, the key assumption is that changes in the proportion of higher-income students in a classroom are driven by the introduction of an AP course. This assumption would be invalid if treated school subjects experienced concurrent increases in upper-income enrollment or if other school-level changes (e.g., hiring of experienced teachers, changes in school leadership) correlated with AP course introduction were driving the observed effects. While I can examine pre-trends to test for compositional changes, unobserved simultaneous changes at the school level cannot be fully ruled out. I provide some suggestive evidence using data on teachers that the impact is not driven by changes in teacher quality or general expansion of the number of courses offered, but acknowledge the potential for other unobserved confounding factors like changes in school principal or parent student association involvement.

A potential concern with the traditional difference-in-differences design when treatment timing varies is that treatment effects may be gradual and heterogeneous, making [previously] treated units poor comparison units. To address this concern, I estimate treatment effects separately for each treated unit based on the timing of when an advanced course is added and only use never-treated school-by-subject-a cells as the comparison group. I then take the weighted average of those estimates.[12] This approach applies the stacked difference-in-differences estimator proposed by Callaway and Sant'Anna (2021), which corrects for biases in traditional DiD designs caused by

12. I use the regression weighting of the coefficients where the weights are based on the variance and number of units in each treatment group. This weighting method tends to over weight units treated in the middle of the time period. The main estimates are not sensitive to weighting by the number of observations only.

heterogeneous treatment effects and staggered treatment timing.

Students in control and later treated school subjects tend to have similar demographics compared to always treated school subjects as shown in Table A2.[13] The identification strategy does not require later treated and control school subjects to be identical, but rather that, in the absence of AP course addition, they would have exhibited similar trends. Since the treatment is defined at the subject level, schools could have some treated subjects and some never treated (control) subjects.

4 Supply and Demand-Side Changes Leading Up to the Addition of an AP Course

To better understand and interpret the results, we need to examine the factors that may lead schools to add an AP course in a given year. The Northwest Independent School District in Texas states on its website that "Campuses base decisions to offer courses by considering the number of requests from students and the availability of qualified staff." Administrative constraints that may limit a school's ability to offer an AP course may include finding a teacher who is both able and qualified to teach the course and completing an AP course audit requirement to get approval for the "AP" designation from the college board (TEA, 2023).[14] Iatarola, Conger and Long (2011) find that in Florida the number of advanced (AP and IB) courses a school offers is primarily driven by having a large enough number of high-achieving students; the number and qualifications of teachers, in contrast, appear to play a minor role.[15]

In the absence of data on student requests for AP courses or detailed teacher qualifications (beyond years of experience),[16] I analyze potential shifts in student income and achievement composition within school subjects leading up to the addition of an AP course (demand-side changes).

13. Table A5 summarizes the number of courses offered, number of students, and the share of upper-income students for each of the control and later treated schools by subject area.

14. The AP designation is unlikely to pose significant barriers. The college Board typically grants approval for the AP course designation 60 days after submitting an AP course audit, and schools may assign the "AP" designation before receiving official authorization if they are in the process of obtaining it (College Board, 2025). Approval is teacher-specific; the College Board requires a new audit submission if a different instructor is assigned to the course (College Board, 2025).

15. They determine the relative importance of the number of students versus the number of teachers by running a cross-sectional probit regression, using these variables along with a vector of other student characteristics, with the number of AP courses offered by the school as the outcome.

16. There is no clear description of what qualifies a teacher to teach an AP course besides having to submit for an AP course audit to offer an AP course. In Texas, I find no evidence that AP course teachers are more/less experienced than other teachers in the same school.

It is plausible that an increase in the proportion of higher-income students or students with stronger academic preparation could drive demand for AP courses. These students may be more likely to request advanced courses, prompting schools to introduce them.

There does not appear to be an increase in the share of upper-income students or higher-achieving students prior to the addition of an AP course, as shown in Figure 2. Higher-achieving students are defined as those scoring in the top 25th percentile of their grade 8 reading or math test scores, based on the distribution of student test scores in the full sample for a given year. However, average standardized math test scores for students show an upward trend prior to the addition of an AP course and continue to improve afterward, as depicted in Figure 2. This pattern suggests that improved math preparation among students may increase the likelihood of a school introducing an AP course. The number of students enrolled in the school might also determine if there is enough demand for AP courses. Prior to adding an AP course, schools seem to be increasingly enrolling more students as shown in Figure A1. The average school size flattens around 1000 students four years prior to the AP course addition, and then starts increasing again after the AP course addition flattening around 1400 students four years after.[17]

I also investigate potential shifts in teacher experience or the arrival of new administrators before the addition of an AP course (supply-side changes). For instance, a newly hired teacher might advocate for adding and teaching an AP course. Similarly, a new principal with a strong belief in the value of AP courses might prioritize introducing them. Schools appear more likely to hire a new teacher in the year preceding the addition of an AP course. The share of new teachers—defined as those who did not work at the treated school in the prior year—peaks in the year immediately before the AP course is introduced, as shown in Figure 3. This may indicate that the hiring of new teachers facilitates the introduction of an AP course, or alternatively, that schools anticipate adding an AP course and hire new teachers as part of their preparation.

While I cannot observe principal hires in the data, I can track the hiring of "administrators," defined as individuals employed in non-teaching roles within the district. There is some evidence of

17. The number of higher achieving students (students more likely to demand and enroll in an AP course) also seems to increase and flatten around 200 students by the time an AP course is added. The trend for higher income students is less clear; the average number of higher income students enrolled appears to decrease slightly from 200 to closer to 100 prior to the addition of an AP course, and then increase slightly following the addition of the AP course.

a slight increase in the share of new administrators in the district leading up to the addition of an AP course, followed by a modest decline in subsequent years. However, this pattern is less distinct.

5 Results

5.1 Impact of AP Courses on Lower-Income Students' Exposure to Higher-Income Students

After the initial addition of an AP course, the number of AP courses in the subject area grows, reaching approximately 1.5 courses by the fourth year, as shown in Figure 4.[18] This sustained increase suggests that the addition of an AP course is not a temporary change, on average. The introduction of an AP course increases AP enrollment among lower-income students by roughly 5 percentage points. The increase in AP course enrollment is similar for both higher- and lower-income students as shown in Figure 5. Lower-income students with higher eighth-grade reading test scores are more likely to enroll in AP courses overall. As shown in Figure 7(a), lower-income students who scored in the bottom and top quintile of the grade 8 reading test are 3.8 and 10.6 percentage points more likely to enroll in an AP course following the addition of an AP course in the subject area.

I find that adding an AP course does not decrease lower-income students' share of upper-income classmates. If anything, the addition of an AP course seems to increase lower-income students' exposure to upper-income classmates, measured by the share of a student's total classmates in the subject area who are upper-income. The increase in exposure to upper-income students unfolds gradually, stabilizing around the sixth year at 2 percentage points, as shown in Figure 6. Following the addition of an AP course, lower-income students' average share of higher-income classmates increased by 1 percentage point ($p < 0.001$)—a 9% increase in the share of upper-income classmates. I find a similar impact on lower-income students' share of upper-income classmates if I define exposure as the share of total classmates in the school (not only in the treated subject) who are upper-income as shown in Table A6.[19]

18. 85% of treated subjects add only one course in the first year an AP course is added.

19. We might be concerned that lower-income students in treated subjects may be more likely to be higher-achieving following the addition of an AP course in the subject, and so happen to share more classrooms with upper-income students. To address this concern I also look at the average lower-income students' share of upper-income classmates

The increase in exposure to upper-income classmates for lower-income students may arise from two primary mechanisms: (1) a composition shift, whereby the addition of an AP course increases the share of upper-income students participating in the subject area, and (2) a sorting change, whereby income-based sorting within the subject increases. I define sorting as the difference between the average proportion of upper-income classmates in upper- relative to lower-income students' classrooms in a subject area.[20]

Evidence supports both mechanisms. Following the addition of an AP course, the proportion of higher-income students enrolled in treated school subjects rises by 1.13 percentage points, as shown in Table 3 and Figure 9, consistent with a composition change. Simultaneously, there is evidence of an increase in income-based sorting within the subject: the difference in the proportion of upper-income classmates between upper- and lower-income students widens by 0.52 percentage points, as shown in Table 3. The increase in sorting across classrooms by income is offset by the larger increase in the share of upper-income students in the subject. The 1.13 percentage point increase in share of upper-income students in treated subjects is slightly larger than the 1.0 percentage point increase in lower-income students' share of upper-income classmates in treated subjects, suggesting that in the absence of sorting by income lower-income students would have been exposed to slightly more upper-income students in treated subjects.

The increase in the share of upper-income students in the subject area may result from shifts in students' course-taking patterns, without any change in the overall school composition—that is, students may simply be redistributing across classrooms. To determine if the school composition itself changes, I examine the effect of adding an AP course in a subject on the share of upper-income students in the entire school. The results, shown in Table 3, indicate that following the introduction of an AP course in a subject area, the proportion of upper-income students enrolled in the school increased by 0.97 percentage points. As such, the rise in exposure to upper-income peers may be driven, at least in part, by a growing share of upper-income students choosing to

independent of if the lower-income student enrolls in the treated subject or not. I similarly find that the average lower-income students' share of upper-income classmates increased by 0.93 percentage points following the addition of an AP course as shown in Table A6.

20. This measure of sorting is very similar to the variance ratio, but instead of looking at the difference between upper- and all other income students' classrooms, I look at upper- relative to lower-income students' classrooms. I do not include students' own income status.

enroll in the school.[21]

The addition of an AP course may attract or retain students in a high school who would have otherwise chosen to attend another school within the same district. Alternatively, it may draw higher-income students from neighboring districts or those who would have otherwise attended private schools. I find that the addition of an AP course increases the share of upper-income students in the district by 0.56 percentage points, with no detectable impact on other schools within the district, as shown in Table 4. The increase in the share of upper-income students in the district suggests that the observed increase in the share of upper-income students may be driven by higher-income students who would have otherwise attended private schools or enrolled in another district. This finding aligns with Epple, Newlon, and Romano (2002) model prediction that increased tracking can attract or retain higher-income students in public schools.

The impact of adding AP coursework on the share of higher-income students may vary by subject area. For example, in subjects such as mathematics, where AP enrollment may rely heavily on prior preparation, lower-income students may benefit less from the addition of AP courses. The observed increase in exposure to higher-income students is primarily driven by AP courses in science, foreign languages, technology and fine arts, as shown in Figure 8.

The increase in the share of upper-income classmates following the introduction of an AP course appears similar across students with varying test scores, as shown in Figure 7(b) and Table 5. The similar impact on the share of upper-income classmates across achievement levels is consistent with the notion that the addition of an AP course led to an overall increase in the proportion of upper-income students in the school. Consequently, regardless of whether a student enrolls in an AP course, they are more likely to share a classroom with upper-income peers.

The identification assumption for these results requires that the observed impacts stem from the AP course addition rather than from other simultaneous school-level changes. It is possible that AP courses are introduced alongside other changes—such as a new principal or the arrival of an experienced teacher—that could also affect outcomes. Some of these simultaneous changes, like

21. There are 944 control school subjects in which no AP course is added during the analysis period but are in schools that have at least one other subject that is treated. These 944 school subjects may be impacted by spillovers from treated subjects in the same school. The estimates are slightly larger when excluding those 944 control school subjects that are more prone to spillovers as shown in Table A10.

hiring a new teacher, could be thought of as part of the "treatment package"—what would need to take place for an advanced course to be added. That said, it is important to understand what part of this package may be driving the estimates. I include teacher-school-subject fixed effects to isolate the impact of AP course additions accounting for teacher changes. The estimates remain consistent, though slightly smaller, with the inclusion of teacher fixed effects, suggesting that the estimates are not solely driven by changes in teacher quality.

Adding an AP course appears to increase the total number of courses offered in a school subject area by approximately six courses. The increase in number of courses suggests that the addition of an AP course is not merely a rebranding or substitution of an existing course but represents a genuine expansion of course offerings. However, it also raises the possibility that the observed change in exposure to upper-income students could be driven by the simultaneous increase in course options, rather than the specific characteristics of the AP course itself. To address this concern, in Model (2) of Table 3, I control for the total number of courses offered in a school subject in a given year. The estimates remain consistent when controlling for the number of courses offered, suggesting that the observed change in the share of upper-income students is likely attributable to the AP course rather than the general increase in the number of courses.

The increase in the number of courses offered (beyond just the AP course) might also be driven by changes in the school size following the addition of an AP course. The number of students enrolled in a school subject (i.e., number of students who take at least one course in the subject) increases by about 70 students on average following the addition of an AP course as shown in Table 8 and Figure 10 panel (a). There appears to be no detectable impact on the number of higher income students enrolled in the school, though the direction of the estimate is positive (around two more higher-income students on average) and as shown in the trend line in Figure 10 panel (b).[22]

Because schools tend to add an AP course in their earlier years (20% of schools add an AP course in their second year, as shown in Figure 1, the estimates might be influenced by new schools undergoing multiple simultaneous changes. To test this, I exclude new schools (defined as those open for three years or less by 2011) from the analysis. The results remain consistent: the share of upper-income classmates for lower-income students increases following the addition of an AP

22. I also find a similar increase in the number of students enrolled in the school of about 90 more students following the addition of an AP course as shown in Table A9.

course by 1.2 percentage points, as shown in Figure 11, panel (a) and Table A8.

In Figure 6 it is not clear if there is a slight upward trend in the share of upper-income students in the years right before the addition of an AP course. I try to bound the estimates and address this concern by excluding treated schools that exhibit a positive trend ($slope >= 0.001$) in the share of upper-income students during the four years preceding the addition of an AP course ($t = -4$ to $t = -1$). Even after excluding these schools, the trend of increasing upper-income classmates for lower-income students following the addition of an AP course remains consistent, as shown in Figure 11, panel (b).

5.2 Impact of AP Courses on Lower-Income Students' Exposure to Higher-Achieving Students

Epple, Newlon, and Romano (2002) hypothesize that tracking in public schools retains higher-income, higher-achieving students who might otherwise attend private schools. However, they also suggest that higher-income, lower-achieving students may leave public schools in favor of less-tracked private school environments. Contrary to this prediction, I find that the increase in the share of upper-income students following the addition of an AP course is primarily driven by upper-income students who are not higher-achieving (i.e., those who scored below the 75th percentile on their grade 8 test scores). I find evidence of a modest (0.3 percentage point) increase in the share of higher-achieving, upper-income students following the addition of an AP course, as shown in Table 7.[23]

I also find a slight decrease in lower-income students' exposure to higher-achieving classmates following the addition of an AP course (-0.8 percentage points), as shown in Table 6. However, this decrease appears to be temporary, returning to approximately zero by the sixth year after the AP course is added, as illustrated in Figure 12. The decrease in the share of higher-achieving students seems to be driven by new schools (schools that were open for three years or less by 2011). As shown in Table A8, the decrease in the share of higher-achieving students is halved when excluding new schools, and the coefficient becomes insignificant.

Additionally, I find no evidence of changes in the level of sorting by test score following the

23. The estimates are similar when using grade 8 math test scores, as shown in Table A7.

addition of an AP course, as shown in Table 6. Sorting by test score is defined as the difference in the share of higher-achieving students in the school between higher-achieving (75th percentile) and lower-achieving (25th percentile) students, based on grade 8 reading scores.[24]

6 Discussion and Conclusion

This study examines the impact of adding advanced courses on lower-income students' classroom composition by leveraging variation in the timing of AP course additions across schools and subject areas in Texas. Following the addition of an AP course, I find that lower-income students' share of upper-income classmates increases. This increase, driven primarily by a rise in the overall share of upper-income students in the school, offsets any increase in income-based sorting across classrooms in a subject area.

The findings contribute to a nuanced understanding of how advanced coursework shapes school and classroom student demographics. Prior research has largely focused on the effects of advanced coursework on college enrollment and student performance, often overlooking the implications for classroom and school socioeconomic integration. By examining how AP courses shape classroom environments, this study provides a more comprehensive perspective on their role in promoting educational equity.

These findings underscore the importance of considering both within-school sorting and broader school composition when evaluating the equity implications of advanced coursework. The results suggest that introducing AP courses can enhance lower-income students' exposure to upper-income classmates without substantially increasing income or achievement-based segregation within schools, challenging common assumptions. It suggests advanced coursework may serve as a tool to attract and retain upper-income families in public schools, potentially reducing socioeconomic stratification.

24. The estimates are consistent when using math test scores, as shown in Table A7.

7 References

Alcaino, M., & Jennings, Jennifer. L. (2020). How Increased School Choice Affects Public School Enrollment and School Segregation. https://doi.org/10.26300/83XJ-8E66

Angrist, J. D., & Lang, K. (2004). Does School Integration Generate Peer Effects? Evidence from Boston's Metco Program. American Economic Review, 94(5), 1613–1634. https://doi.org/10.1257/00028280430521

Antonovics, K., Black, S. E., Cullen, J. B., & Meiselman, A. Y. (2022). Patterns, Determinants, and Consequences of Ability Tracking: Evidence from Texas Public Schools (Working Paper No. 30370). National Bureau of Economic Research. https://doi.org/10.3386/w30370

Avery, C., & Pathak, P. A. (2021). The Distributional Consequences of Public School Choice. American Economic Review, 111(1), 129–152. https://doi.org/10.1257/aer.20151147

Biasi, B. (2019). School Finance Equalization Increases Intergenerational Mobility: Evidence from a Simulated-Instruments Approach (Working Paper 25600).
National Bureau of Economic Research. https://doi.org/10.3386/w25600

Billings, S. B., Deming, D. J., & Rockoff, J. (2014). School Segregation, Educational Attainment, and Crime: Evidence from the End of Busing in Charlotte-Mecklenburg*. The Quarterly Journal of Economics, 129(1), 435–476. https://doi.org/10.1093/qje/qjt026

Callaway, B., & Sant'Anna, P. H. C. (2021). Difference-in-Differences with multiple time periods. Journal of Econometrics, 225(2), 200–230. https://doi.org/10.1016/j.jeconom.2020.12.001

Campbell, Jordan & Smith, Aaron Garth. (2021) "Analaysis of Texas School District Open Enrollment Data," Reason Foundation. https://reason.shinyapps.io/texas_student_transfer_dashboard/

Card, D., & Giuliano, L. (2016). Universal screening increases the representation of low-income and minority students in gifted education. Proceedings of the National Academy of Sciences, 113(48), 13678–13683. https://doi.org/10.1073/pnas.1605043113

Carrell, S. E., Hoekstra, M., & West, J. E. (2019). The Impact of College Diversity on Behavior toward Minorities. American Economic Journal: Economic Policy, 11(4), 159–182. https://doi.org/10.1257/pol.201

Census (2023). QuickFacts. Retrieved by March 11, 2025 from: https://www.census.gov/quickfacts/fact/table/T

Chetty, R., Grusky, D., Hell, M., Hendren, N., Manduca, R., & Narang, J. (2017). The fading American dream: Trends in absolute income mobility since 1940. 9.

Chetty, R., Jackson, M. O., Kuchler, T., Stroebel, J., Hendren, N., Fluegge, R. B., Gong, S., Gonzalez, F., Grondin, A., Jacob, M., Johnston, D., Koenen, M., Laguna-Muggenburg, E., Mudekereza, F., Rutter, T., Thor, N., Townsend, W., Zhang, R., Bailey, M., ... Wernerfelt, N. (2022a). Social capital I: Measurement and associations with economic mobility. Nature, 608(7921), Article 7921. https://doi.org/10.1038/s41586-022-04996-4

Chetty, R., Jackson, M. O., Kuchler, T., Stroebel, J., Hendren, N., Fluegge, R. B., Gong, S., Gonzalez, F., Grondin, A., Jacob, M., Johnston, D., Koenen, M., Laguna-Muggenburg, E., Mudekereza, F., Rutter, T., Thor, N., Townsend, W., Zhang, R., Bailey, M., ... Wernerfelt, N. (2022b). Social capital II: Determinants of economic connectedness. Nature, 608(7921), Article 7921. https://doi.org/10.1038/s41586-022-04997-3

Clotfelter, C. T., Ladd, H. F., Clifton, C. R., & Turaeva, M. R. (2021). School Segregation at the Classroom Level in a Southern 'New Destination' State. Race and Social Problems, 13(2), 131–160. https://doi.org/10.1007/s12552-020-09309-w

Clotfelter, C. T., Ladd, H. F., & Vigdor, J. L. (2002). Segregation and Resegregation in North Carolina's Public School Classrooms Do Southern Schools Face Rapid Resegregation. North Carolina Law Review, 81(4), 1463–1512.

Cohodes, S. R. (2020). The Long-Run Impacts of Specialized Programming for High-Achieving Students. American Economic Journal: Economic Policy, 12(1), 127–166. https://doi.org/10.1257/pol.20180315

Collins, C., & Gan, L. (2013). Does Sorting Students Improve Scores? An Analysis of Class Composition (w18848; p. w18848). National Bureau of Economic Research. https://doi.org/10.3386/w18848

College Board. (2025). About AP course audit. Retrieved Feb 27, 2025, from https://apcentral.collegeboard.org/course-audit/about

Conger, D., Long, M. C., & Raymond, M. J. (2020). Advanced Placement and Initial College Enrollment: Evidence from an Experiment. https://doi.org/10.26300/CX24-VX18

Corno, L., La Ferrara, E., & Burns, J. (2022). Interaction, Stereotypes, and Performance: Evidence from South Africa. American Economic Review, 112(12), 3848–3875. https://doi.org/10.1257/aer.20181805

Dalane, K., & Marcotte, D. E. (2022). The Segregation of Students by Income in Public Schools. Educational Researcher, 51(4), 245–254. https://doi.org/10.3102/0013189X221081853

Domina, T., Penner, A., & Penner, E. (2017). Categorical Inequality: Schools As Sorting Machines. Annual Review of Sociology, 43, 311–330. https://doi.org/10.1146/annurev-soc-060116-053354

Duflo, E., Dupas, P., & Kremer, M. (2011). Peer Effects, Teacher Incentives, and the Impact of Tracking: Evidence from a Randomized Evaluation in Kenya. American Economic Review, 101(5), 1739–1774. https://doi.org/10.1257/aer.101.5.1739

Epple, D., Newlon, E., & Romano, R. (2002). Ability tracking, school competition, and the distribution of educational benefits. Journal of Public Economics, 83(1), 1–48. https://doi.org/10.1016/S0047-2727(00)00175-4

Figlio, D. N., & Page, M. E. (2002). School Choice and the Distributional Effects of Ability Tracking: Does Separation Increase Inequality? Journal of Urban Economics, 51(3), 497–514. https://doi.org/10.1006/juec.2001.2255

Figlio, D. N., & Özek, U. (2023). The Unintended Consequences of Test-Based Remediation (Working Paper 30831). National Bureau of Economic Research. https://doi.org/10.3386/w30831

Gerring, J. (2012). Mere Description. British Journal of Political Science, 42(4), 721–746.

Goodman, J., Hurwitz, M., Mulhern, C., & Smith, J. (2019). O Brother, Where Start Thou? Sibling Spillovers in College Enrollment (w26502; p. w26502). National Bureau of Economic Research. https://doi.org/10.3386/w26502

Hoxby, C. (2000). Peer Effects in the Classroom: Learning from Gender and Race Variation (Working Paper 7867; Working Paper Series). National Bureau of Economic Research. https://doi.org/10.3386/w78

Iatarola, P., Conger, D., & Long, M. C. (2011). Determinants of High Schools' Advanced Course Offerings. Educational Evaluation and Policy Analysis, 33(3), 340–359. https://doi.org/10.3102/016237371139812

Jackson, C. K. (2014). Do College-Preparatory Programs Improve Long-Term Outcomes? Economic Inquiry, 52(1), 72–99. https://doi.org/10.1111/ecin.12040

Klopfenstein, K. (2004). Advanced Placement: Do minorities have equal opportunity? Economics of Education Review, 23(2), 115–131. https://doi.org/10.1016/S0272-7757(03)00076-1

Kalogrides, D., & Loeb, S. (2013). Different Teachers, Different Peers: The Magnitude of Student Sorting Within Schools. Educational Researcher, 42(6), 304–316. https://doi.org/10.3102/0013189X13495087

Kerckhoff, A. C. (1995). Institutional Arrangements and Stratification Processes in Industrial Societies. Annual Review of Sociology, 21(1), 323–347. https://doi.org/10.1146/annurev.so.21.080195.001543

Loeb, S., Dynarski, S., McFarland, D., Morris, P., Reardon, S., & Reber, S. (2017). Descriptive Analysis in Education: A Guide for Researchers. NCEE 2017-4023. In National Center for Education Evaluation and Regional Assistance. National Center for Education Evaluation and Regional Assistance. https://eric.ed.gov/?id=ED573325

Lucas, S. R., & Berends, M. (2002). Sociodemographic Diversity, Correlated Achievement, and De Facto Tracking. Sociology of Education, 75(4), 328–348. https://doi.org/10.2307/3090282

Mallah, Farah (2024). Schools and Social Capital: Economic Segregation and Long-term Outcomes. Working Paper.

Moody (2001). Race, School Integration, and Friendship Segregation in America. American Journal of Sociology. 107(3), 679-716. https://doi.org/10.1086/338954

Monarrez, T., Kisida, B., & Chingos, M. (2022). The Effect of Charter Schools on School Segregation. American Economic Journal: Economic Policy, 14(1), 301–340. https://doi.org/10.1257/pol.20190682

Nechyba, T. J. (2006). Chapter 22 Income and Peer Quality Sorting in Public and Private Schools. In E. Hanushek & F. Welch (Eds.), Handbook of the Economics of Education (Vol. 2, pp. 1327–1368). Elsevier. https://doi.org/10.1016/S1574-0692(06)02022-8

Owen, S. (2024). The Advanced Placement Program and Educational Inequality. Education Finance and Policy, 1–32. https://doi.org/10.1162/edfp_a_00424

Owens, A., Reardon, S. F., & Jencks, C. (2016). Income Segregation Between Schools and School Districts. American Educational Research Journal, 53(4), 1159–1197. https://doi.org/10.3102/0002831216652722

Owens, A., & Candipan, J. (2019). Social and spatial inequalities of educational opportunity: A portrait of schools serving high- and low-income neighbourhoods in US metropolitan areas. Urban Studies, 56(15), 3178–3197. https://doi.org/10.1177/0042098018815049

Phillips, K. J. R., Larsen, E. S., & Hausman, C. (2015). School choice & social stratification: How intradistrict transfers shift the racial/ethnic and economic composition of schools. Social Science Research, 51, 30–50. https://doi.org/10.1016/j.ssresearch.2014.12.005

Texas Education Agency. (2023). Advanced Placement and International Baccalaureate General Information, 2021-22. Retrieved from https://tea.texas.gov/reports-and-data/school-performance/accountability-research/ap-ib-general-info-2021-22.pdf

Rao, G. (2019). Familiarity Does Not Breed Contempt: Generosity, Discrimination, and Diversity in Delhi Schools. American Economic Review, 109(3), 774–809. https://doi.org/10.1257/aer.20180044

Roy, Susha. (2022) Impacts of Public School Choice on Neighborhoods: Evidence from Los Angeles Impacts of School. Job Market Paper. Retrieved September 21, 2023

Sacerdote, B. (2001). Peer Effects with Random Assignment: Results for Dartmouth Roommates*. The Quarterly Journal of Economics, 116(2), 681–704. https://doi.org/10.1162/00335530151144131

Sacerdote, B. (2011). Peer Effects in Education: How Might They Work, How Big Are They and How Much Do We Know Thus Far? In Handbook of the Economics of Education (Vol. 3, pp. 249–277). Elsevier. https://doi.org/10.1016/B978-0-444-53429-3.00004-1

Zimmerman, S. D. (2019). Elite Colleges and Upward Mobility to Top Jobs and Top Incomes. American Economic Review, 109(1), 1–47. https://doi.org/10.1257/aer.20171019

8 Main Tables and Figures

Table 1: High School Student Courses by Grade (2019)

Variable	G9	G10	G11	G12
Total Courses Enrolled In	8.21	8.265	8.110	7.826
	(1.637)	(1.688)	(1.803)	(1.902)
Total Advanced Courses	.224	.418	1.161	1.565
	(.487)	(.78)	(1.655)	(1.842)
Total AP Courses	.143	.311	.743	.906
	(.38)	(.644)	(1.269)	(1.565)
Total IB Courses	0	.001	.07	.062
	(.013)	(.048)	(.608)	(.587)
Total Advanced (Other) Courses	.081	.105	.348	.598
	(.284)	(.34)	(.569)	(.746)
Total Dual-Credit Courses	.257	.521	1.772	2.28
	(.619)	(.964)	(1.459)	(1.625)
Total ELA Courses	2.37	2.355	2.343	2.243
	(.895)	(.887)	(.916)	(.963)
Total Math Courses	2.053	2.07	2.054	1.774
	(.531)	(.566)	(.672)	(1.017)
Total Science Courses	1.985	2.044	1.938	1.239
	(.394)	(.564)	(.94)	(1.188)
Total Social Studies Courses	1.897	2.069	2.332	2.193
	(.577)	(.738)	(.944)	(1.001)
Total Foreign Language Courses	1.418	1.322	.671	.275
	(.968)	(1.001)	(.982)	(.727)
Total Fine Arts Courses	1.291	1.229	1.084	.92
	(1.228)	(1.313)	(1.391)	(1.392)
Total Technology Courses	.109	.102	.103	.083
	(.457)	(.479)	(.508)	(.461)
Total Physical Ed. and Health Courses	1.66	1.079	.810	.594
	(.968)	(1.04)	(1.004)	(.893)
Total Business Courses	0	0	0	0
	(0)	(0)	(0)	(0)
Total CTE Courses	1.675	2.245	2.635	2.753
	(1.392)	(1.695)	(1.981)	(2.187)
Number of Students	431824	396810	369572	344011

Notes. Table summarizes high school students' course patterns who are enrolled in Texas public schools in 2019. The course categorizations are based on Texas grouping of courses to subject areas. The number in brackets is the standard deviations from the mean. In Table A3 I split the summary statistics further by income group.

Table 2: Student Demographics by Subject-Area Treatment Status

Variable	Control	Later Treated	Always Treated
Higher-Income Students	.243	.255	.282
	(.429)	(.436)	(.45)
Lower-Income Students	.265	.304	.287
	(.441)	(.46)	(.452)
Hispanic Students	.396	.469	.506
	(.489)	(.499)	(.5)
Black Students	.093	.121	.139
	(.291)	(.326)	(.346)
White Students	.502	.39	.313
	(.5)	(.488)	(.464)
ESL Students	.041	.047	.082
	(.197)	(.211)	(.274)
Std. Reading Score G8	.174	.136	.049
	(.802)	(.825)	(.942)
Std. Math Score G8	.154	.12	.12
	(.907)	(.936)	(.949)
Missing Reading Score G8	.121	.078	.137
	(.327)	(.267)	(.344)
Missing Math Score G8	.129	.082	.145
	(.336)	(.275)	(.352)
Number of Students	976584	1109609	5615235
Number of Subject-Areas	3794	898	6687
Number of Schools	1142	581	1475

Notes. Table summarizes demographics of students in always treated, later treated and control subject areas. The averages and number of students are based on all years in the sample from 2011 to 2022 (including post-period for treated students).

Table 3: Impact of Addition AP Course on Lower-Income Students' AP Course Enrollment, Classroom, Subject and School Share Higher-Income

	(1)	(2)
AP Course Enrollment	0.0533	0.0535
	(0.00451)	(0.00452)
Control Mean	0	0
N Clusters	1320	1320
Proportion Higher-Income Classmates in Subject	0.0100	0.0101
	(0.00323)	(0.00334)
Control Mean	0.110	0.110
N Clusters	1320	1320
Proportion Higher-Income in Subject	0.0113	0.00981
	(0.00353)	(0.00360)
Control Mean	0.122	0.122
N Clusters	1320	1319
Proportion Higher-Income in School	0.00969	0.00916
	(0.00328)	(0.00342)
Control Mean	0.120	0.120
N Clusters	1320	1320
Sorting by Income	0.00517	0.00379
	(0.00205)	(0.00221)
Control Mean	0.0235	0.0235
N Clusters	1320	1320

The table captures the impact of the addition of an AP course on students' share of higher-income students across courses taken that year in a subject. The estimates are based on coefficient $beta_t$ from equation 1 for post-treatment indicator (post first AP course addition in subject) for lower-income students. Model (2) additionally controls for the number of courses offered in a given year in a school subject. The sorting outcome is based on the difference in exposure to upper-income students between lower- and upper-income students in the same school subject. I imputed the sorting outcome with 0 if a school does not have either lower- or upper-income students in a given year. Standard errors in parentheses are clustered at the school-level. Number of clusters is based on the number of schools. Control Mean is based on treated units average at $t = -1$.

Table 4: Impact of Addition AP Course on Lower-Income Students' District Composition

	(1)	(2)
Proportion Higher-Income in District	0.00557	0.00515
	(0.00310)	(0.00314)
Control Mean	0.140	0.140
N Clusters	1320	1320
Proportion Higher-Income in Other (Not Treated) District School	-0.000647	0.0000503
	(0.00554)	(0.00530)
Control Mean	0.120	0.120
N Clusters	451	451

Similar to Table 3 looking at the impact on district share of upper-income students and the share of upper-income students in other schools in the district excluding treated school. The number of clusters is smaller for the impact on the share of upper-income students because a number of schools are the only schools.

Table 5: Impact of the Addition of an AP Course on Lower-Income Students: By Test-Score

	(1)	(2)	(3)	(4)	(5)
	Q1: Bottom Test-Score	Q2	Q3	Q4	Q5: Top Test-Score
AP Course Enrollment	0.0348	0.0434	0.0589	0.0771	0.0978
	(0.00347)	(0.00379)	(0.00475)	(0.00625)	(0.00817)
Control Mean	0	0	0	0	0
N Clusters	1259	1245	1250	1238	1200
Proportion Upper-Income Classmates	0.0109	0.00921	0.0109	0.0113	0.00585
	(0.00310)	(0.00329)	(0.00371)	(0.00386)	(0.00353)
Control Mean	0.0900	0.110	0.120	0.120	0.120
N Clusters	1259	1245	1250	1238	1200

The table captures the impact of the addition of an AP course on students' AP course enrollment and share of higher-income classmates on lower-income students. Lower-income students are split into five subgroups based on the distribution of grade 8 reading test-scores in the full sample. Standard errors in parentheses are clustered at the school-level. Control Mean is based on treated units average at $t = -1$.

Table 6: Impact of Addition AP Course on Lower-Income Students' Classroom, Subject and School Share Higher-Achieving (Reading)

	(1)	(2)
Proportion Higher-Achieving Classmates in Subject	-0.00870	-0.00756
	(0.00448)	(0.00435)
Control Mean	0.180	0.180
N Clusters	1320	1320
Proportion Higher-Achieving in Subject	-0.00913	-0.00940
	(0.00473)	(0.00460)
Control Mean	0.190	0.190
N Clusters	1320	1320
Proportion Higher-Achieving in School	-0.00930	-0.00923
	(0.00434)	(0.00419)
Control Mean	0.190	0.190
N Clusters	1320	1320
Sorting by Achievement	0.00168	-0.000977
	(0.00470)	(0.00471)
Control Mean	0.0800	0.0800
N Clusters	1320	1320

Similar to Table 3 but looking at the share of higher-achieving students instead of the share of higher-income students. A student is defined as higher-achieving if they scored in the top 25th percentile of their grade 8 reading test-score based on the distribution of student test-scores in the full sample in a given year. Sorting by income is the difference between the average share of higher-achieving students in 25th compared to the 75th percentile students based on their grade 8 reading test-scores. Table A7 in the appendix uses math score instead of reading.

Table 7: Impact of Addition AP Course on Lower-Income Students' Classroom, Subject and School Share Higher-Income Higher-Achieving (Reading)

	(1)	(2)
Proportion Higher-Income and -Achieving Classmates in Subject	0.00265	0.00274
	(0.00140)	(0.00143)
Control Mean	0.0300	0.0300
N Clusters	1320	1320
Proportion Higher-Income and -Achieving in Subject	0.00288	0.00250
	(0.00180)	(0.00180)
Control Mean	0.0400	0.0400
N Clusters	1320	1320
Proportion Higher-Income and -Achieving in School	0.00139	0.00122
	(0.00147)	(0.00149)
Control Mean	0.0400	0.0400
N Clusters	1320	1320

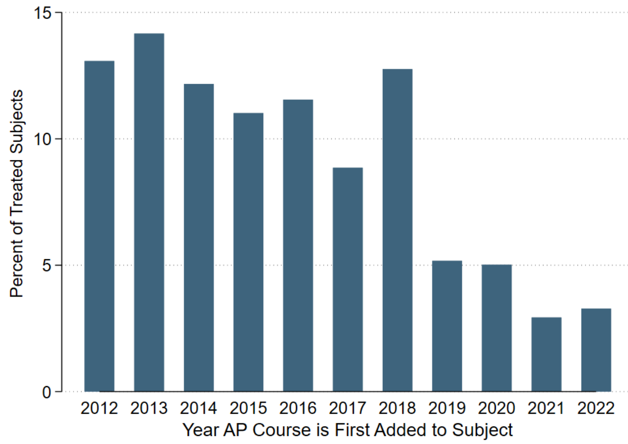
Similar to Table 3 but looking at the share of higher-income higher-achieving students instead of the share of higher-income students. A student is defined as higher-achieving if they scored in the top 25th percentile of their grade 8 reading test-score based on the distribution of student test-scores in the full sample in a given year. Table A7 in the appendix uses math score instead of reading.

Table 8: Impact of Addition AP Course on Number of Students Enrolled in the Subject

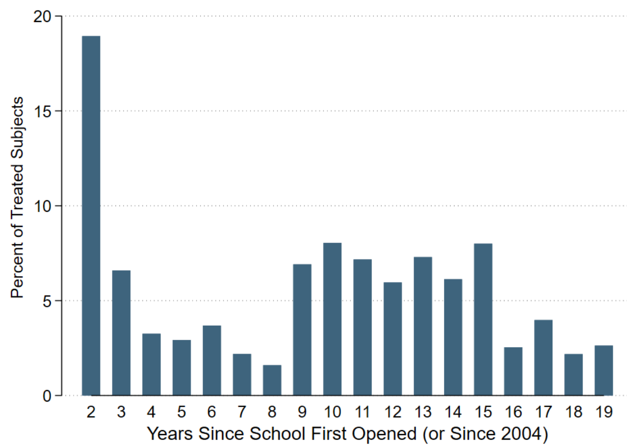
	(1)	(2)
Number of Students Enrolled in Subject	70.38	53.79
	(14.71)	(13.87)
Control Mean	647.7	647.7
N Clusters	1320	1320
Number of Higher-Income Students in Subject	2.680	1.535
	(3.760)	(3.892)
Control Mean	80.30	80.30
N Clusters	1320	1320

The outcomes capture the impact on the total number of students enrolled in the school subject following the addition of an AP course, i.e., the number of students who take at least one course in the subject in a given year. The estimates are based on coefficient $beta_t$ from equation 1 for post-treatment indicator (post first AP course addition in subject) for lower-income students. Model (2) additionally controls for the number of courses offered in a given year in a school subject. Standard errors in parentheses are clustered at the school-level. Number of clusters is based on the number of schools. Control Mean is based on treated units average at $t = -1$.

Figure 1: Timing of AP Course Addition



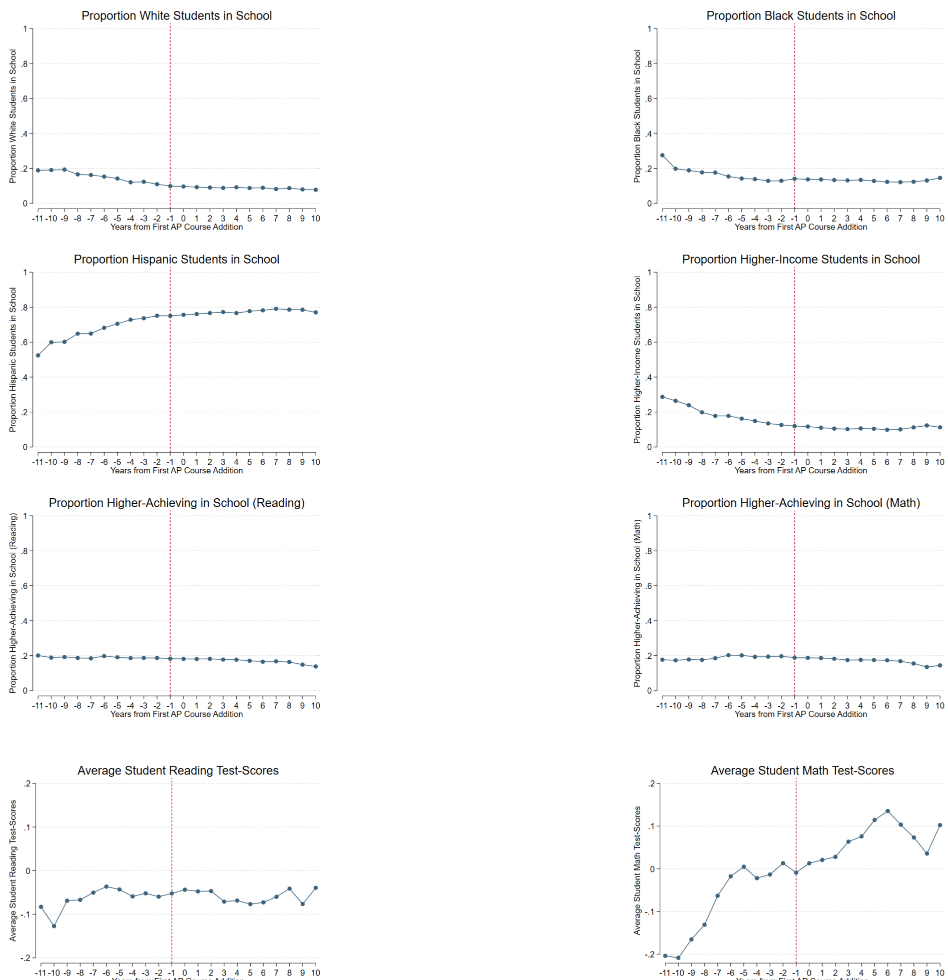
(a) Year School Subject First Adds an AP Course



(b) Year Relative to School Opening When an AP Course is Added

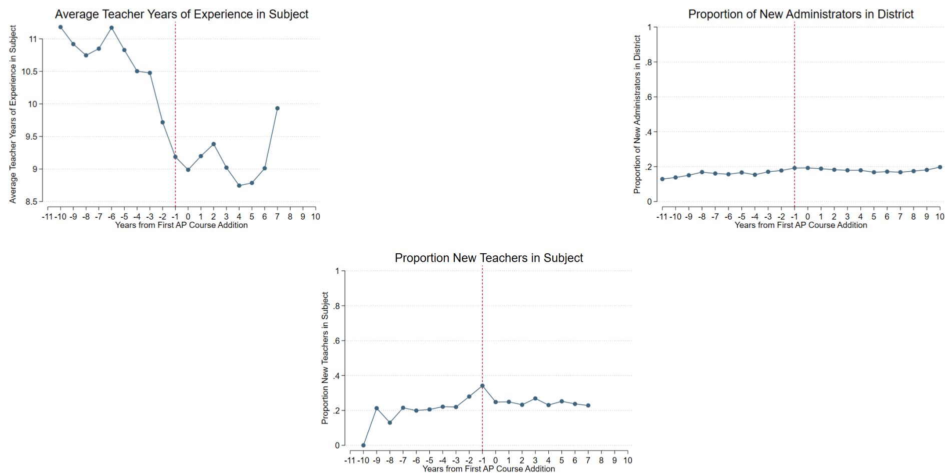
Notes: The histograms capture the timing of when AP courses are first added to a subject. In panel (a) I present the percentage of school subjects that first add an AP course in each year. In panel (b) I present when an AP course is first added relative to school opening year if the school opened after 2004. If the school first opened in 2004, then it shows the number of after 2004 the AP course is first added in the school subject.

Figure 2: Trends in Student Composition Leading Up to the Addition of an AP Course



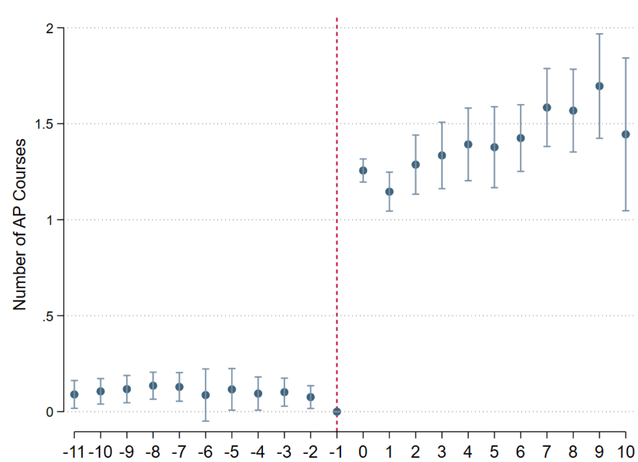
Notes: Each figure presents a change in the average student composition averaged across all treated schools at time t where $t = 0$ is when an AP course is first added to a school subject.

Figure 3: Trends in Teacher and Administration Entry Leading Up to the Addition of an AP Course



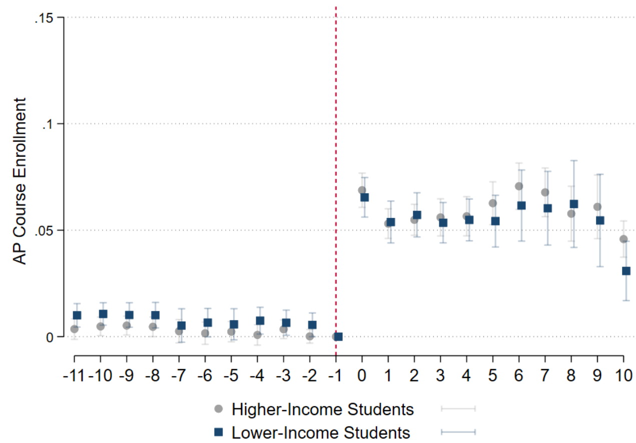
Notes: Each figure presents a change in the average student composition averaged across all treated schools at time t where $t = 0$ is when an AP course is first added to a school subject. The teacher averages are based on the treated subject average. Teachers are linked to student classroom data. A new teacher is defined as a teacher who is first observed in a treated school, since the teacher data can only be linked to students starting 2012, at $t = -10$ I cannot determine if a teacher was enrolled in that same school the prior year, which is why the proportion of new teacher is imputed at 0 that year. I cannot observe administrators role in the data or what school they are assigned, only the district they are assigned. As such, a new administrator is defined as an administrator that was not observed in the treated district in the prior year.

Figure 4: Impact of AP Course Addition on the Number of AP Courses Offered in Subject-Area



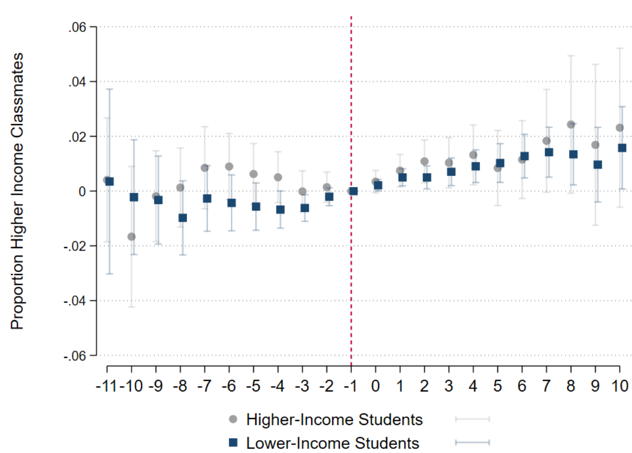
Notes: Plot captures the impact on the number of AP courses offered in a subject-area after an AP course is first added in $t = 0$. Average is weighted by the number of students enrolled. The 95% confidence is based on the standard errors of the coefficients from the regression, clustered at the school-level. The comparison school subject areas are those never treated.

Figure 5: Impact of AP Course Addition on the Likelihood of Enrolling in an AP Course



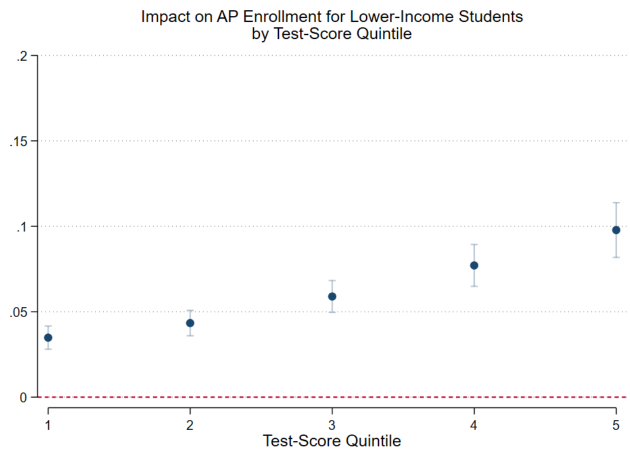
Notes: This event plot captures the impact of treatment on students' likelihood of enrolling in AP course. Plot is based on coefficients $beta_t$ from equation 1 for each income group with the outcome being a binary variable that takes on a value of 1 if a student is enrolled in any AP class in the subject area. The blue dots and lines present the estimates for lower-income students–always on free/reduced lunch status. The grey dots present the estimates for higher-income students–students never on free/reduced lunch status. The regression includes one observation per student subject-area enrollment. The 95% confidence is based on the standard errors of the coefficients from the regression, clustered at the school-level. The comparison school subject areas are those never treated.

Figure 6: Impact of AP Course Addition on the Share of Higher-Income Classmates

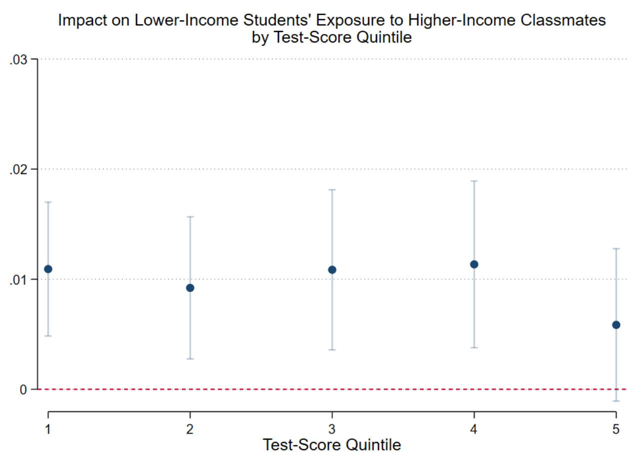


Notes: The event plot is similar to Figure 5 with the outcome being students' subject-area average proportion of higher-income classmates.

Figure 7: Impact of AP Course Addition on Lower-Income Students by Student G8 Test-Score



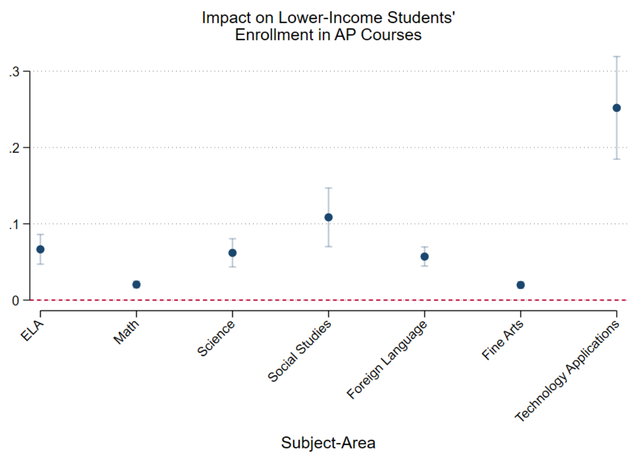
(a) Enrolled in AP Course



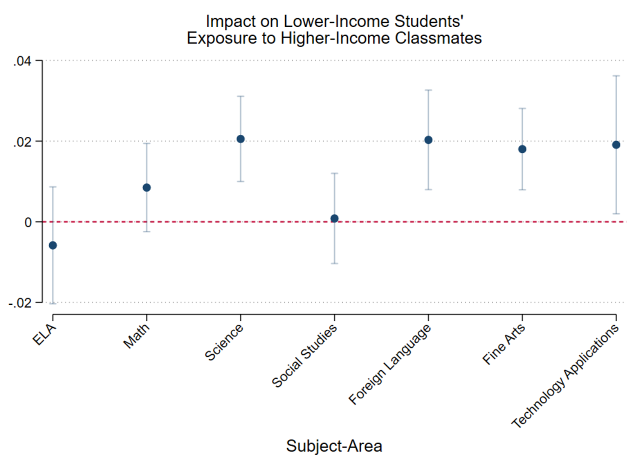
(b) Proportion Higher-Income students

Notes: The plots capture the overall average impact post-treatment for lower-income students in each test-score. The coefficients are based on running the regression with a post-treatment indicator with the same regression specifications as in equation 1. Test-scores are based on grade 8 reading test-scores. Test-scores are missing for 8% of students.

Figure 8: Impact of AP Course Addition on Lower-Income Students by Subject-Area



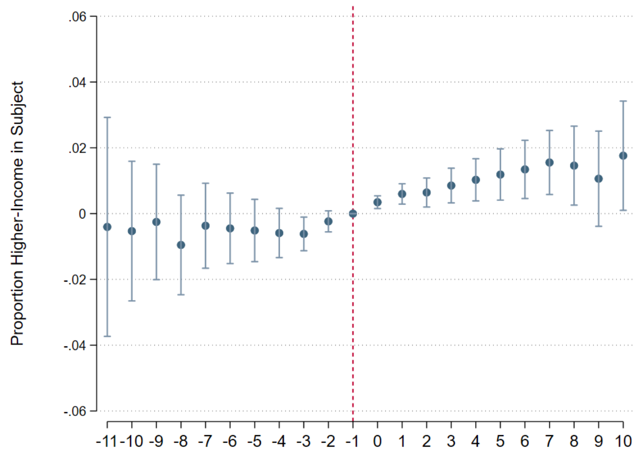
(a) Enrolled in AP Course



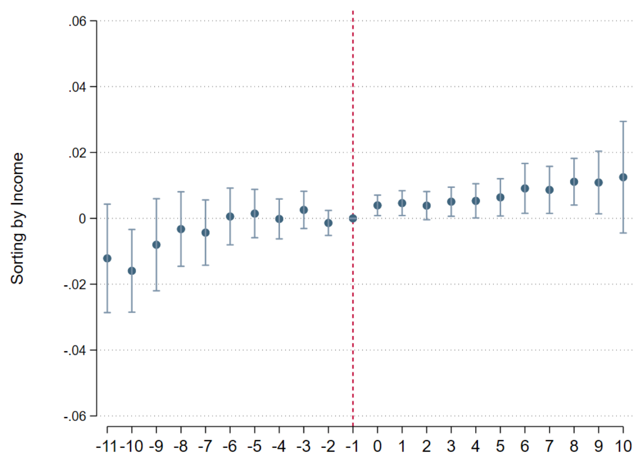
(b) Proportion Higher-Income students

Notes: The plots capture the overall average impact post-treatment for lower-income students in each subject-area. The coefficients are based on running the regression with a post-treatment indicator with the same regression specifications as in equation 1 in separate regression for each subject-area.

Figure 9: Impact of the Addition of AP course on Subject Area Composition and Sorting by Income



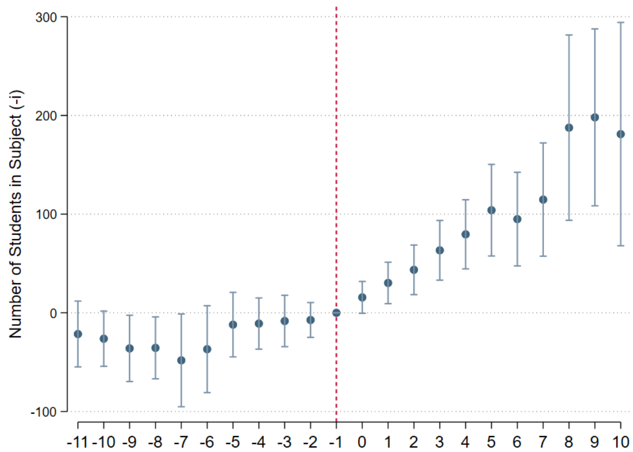
(a) Proportion Higher-Income Students in Subject



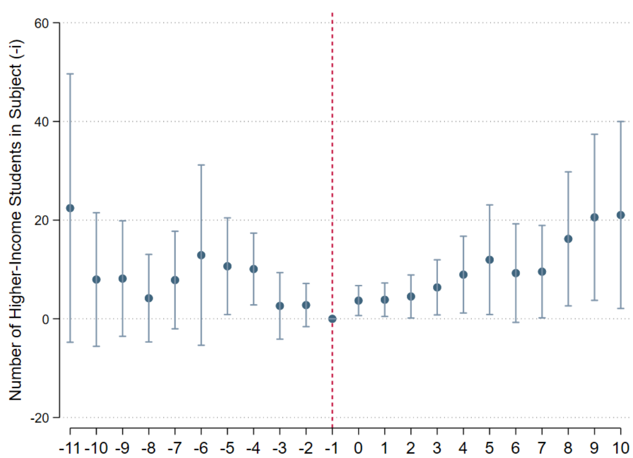
(b) Sorting: Difference in Share of Higher-Income Peers Between Higher- and Lower-Income Students

Notes: Panel (a) outcome is the share of total classroom student enrollments in the subject area who are higher-income. Panel (b) outcome is the difference in the proportion of higher-income classmates in higher-relative to lower-income students' classrooms in a given year. Estimates are weighted by the number of lower-income students enrolled in the subject area in a given year. This number captures the change in the level of sorting by income between classrooms in a subject area across time. The 95% confidence is based on the standard errors of the coefficients from the regression, clustered at the school-level. The comparison school subject areas are those never treated.

Figure 10: Impact of AP Course Addition on the Number of Students Enrolled in At Least one course in the School Subject



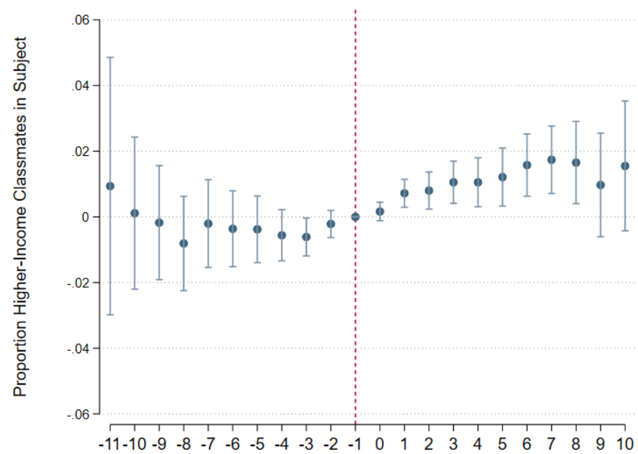
(a) Number of Students



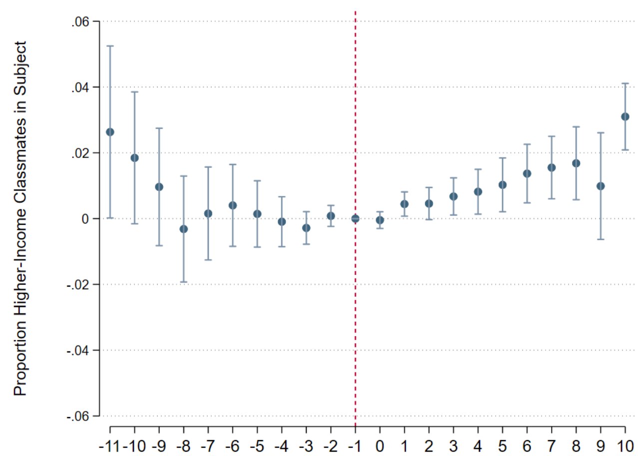
(b) Number of Higher-Income Students

Notes: Panel (a) and (b) capture the change in the number of students prior to and after an AP course is first added to the subject. The number of students enrolled is based on the number of students who take at least one course in the subject area.

Figure 11: Impact of AP Addition on Lower-Income Students' Proportion Upper-Income Classmates: Robustness to Sample Specification



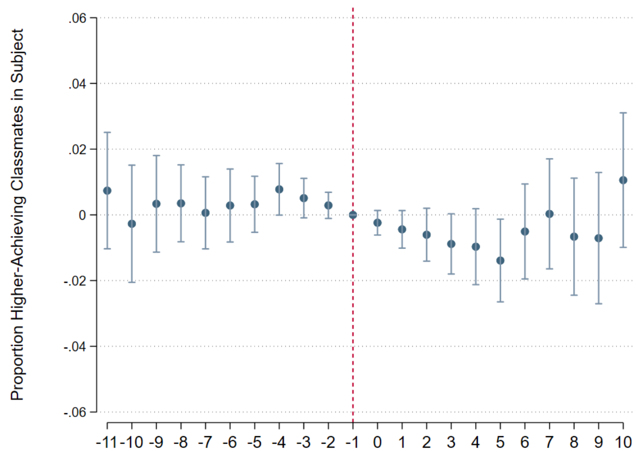
(a) Includes Only Schools that are 4-Years or Older



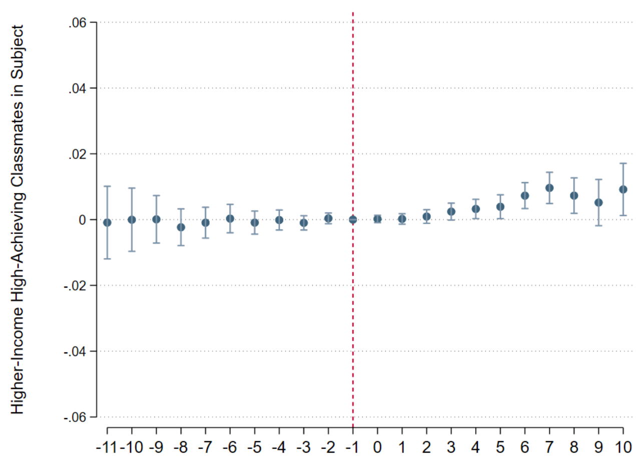
(b) Excludes Schools with Increasing Share of Upper-Income Students Prior to AP Addition

Notes: Panel (a) and (b) capture the change in the share of higher-income classmates prior to and after an AP course is first added in the subject. Panel (a) limits the sample to schools that are three years or older by 2011. Panel (b) excludes schools that in the period right before treatment ($t = -4to - 1$) had an increasing share of upper-income students in the school ($slope >= 0.001$).

Figure 12: Impact of AP Addition on Lower-Income Students' Share of Higher-Achieving Students



(a) Share of Higher-Achieving Students



(b) Share of Higher-Income and Higher-Achieving Students

Notes: Panel (a) outcome is the average share of higher-achieving classmates for lower-income students in the subject. Panel (b) outcome is average share of higher-income and higher-achieving classmates for lower-income students in the subject. Higher-achieving students are those who scored in the top 25th percentiles of their grade 8 reading test. Estimates are weighted by the number of lower-income students enrolled in the subject area in a given year. The 95% confidence is based on the standard errors of the coefficients from the regression, clustered at the school-level. The comparison school subject areas are those never treated.

9 Appendix

Table A1: High School Student Courses by Grade (2019)

Variable	G9	G10	G11	G12
Total Courses Enrolled In	8.21	8.265	8.110	7.826
	(1.637)	(1.688)	(1.803)	(1.902)
Total Advanced Courses	.224	.418	1.161	1.565
	(.487)	(.78)	(1.655)	(1.842)
Total AP Courses	.143	.311	.743	.906
	(.38)	(.644)	(1.269)	(1.565)
Total IB Courses	0	.001	.07	.062
	(.013)	(.048)	(.608)	(.587)
Total Advanced (Other) Courses	.081	.105	.348	.598
	(.284)	(.34)	(.569)	(.746)
Total Dual-Credit Courses	.257	.521	1.772	2.28
	(.619)	(.964)	(1.459)	(1.625)
Total ELA Courses	2.37	2.355	2.343	2.243
	(.895)	(.887)	(.916)	(.963)
Total Math Courses	2.053	2.07	2.054	1.774
	(.531)	(.566)	(.672)	(1.017)
Total Science Courses	1.985	2.044	1.938	1.239
	(.394)	(.564)	(.94)	(1.188)
Total Social Studies Courses	1.897	2.069	2.332	2.193
	(.577)	(.738)	(.944)	(1.001)
Total Foreign Language Courses	1.418	1.322	.671	.275
	(.968)	(1.001)	(.982)	(.727)
Total Fine Arts Courses	1.291	1.229	1.084	.92
	(1.228)	(1.313)	(1.391)	(1.392)
Total Technology Courses	.109	.102	.103	.083
	(.457)	(.479)	(.508)	(.461)
Total Physical Ed. and Health Courses	1.66	1.079	.810	.594
	(.968)	(1.04)	(1.004)	(.893)
Total Business Courses	0	0	0	0
	(0)	(0)	(0)	(0)
Total CTE Courses	1.675	2.245	2.635	2.753
	(1.392)	(1.695)	(1.981)	(2.187)
Number of Students	431824	396810	369572	344011

Notes. Table summarizes high school students' course patterns who are enrolled in Texas public schools in 2019. The course categorizations are based on Texas grouping of courses to subject areas. The number in brackets is the standard deviations from the mean. In Table A3 I split the summary statistics further by income group.

Table A2: Student Demographics by Subject-Area Treatment Status

Variable	Control	Later Treated	Always Treated
Higher-Income Students	.243	.255	.282
	(.429)	(.436)	(.45)
Lower-Income Students	.265	.304	.287
	(.441)	(.46)	(.452)
Hispanic Students	.396	.469	.506
	(.489)	(.499)	(.5)
Black Students	.093	.121	.139
	(.291)	(.326)	(.346)
White Students	.502	.39	.313
	(.5)	(.488)	(.464)
ESL Students	.041	.047	.082
	(.197)	(.211)	(.274)
Std. Reading Score G8	.174	.136	.049
	(.802)	(.825)	(.942)
Std. Math Score G8	.154	.12	.12
	(.907)	(.936)	(.949)
Missing Reading Score G8	.121	.078	.137
	(.327)	(.267)	(.344)
Missing Math Score G8	.129	.082	.145
	(.336)	(.275)	(.352)
Number of Students	976584	1109609	5615235
Number of Subject-Areas	3794	898	6687
Number of Schools	1142	581	1475

Notes. Table summarizes demographics of students in always treated, later treated and control subject areas. The averages and number of students are based on all years in the sample from 2011 to 2022 (including post-period for treated students).

Table A3: High School Student Courses by Grade (2019): By Income

	G9		G10		G11		G12	
Variable	HI	LI	HI	LI	HI	LI	HI	LI
Total Courses Enrolled In	7.923	8.37	7.95	8.477	7.781	8.351	7.483	8.179
	(1.176)	(1.802)	(1.231)	(1.876)	(1.378)	(1.973)	(1.54)	(2.082)
Total Advanced Courses	.327	.201	.656	.352	1.864	.868	2.262	1.26
	(.575)	(.465)	(.974)	(.700)	(1.972)	(1.399)	(2.153)	(1.591)
Total AP Courses	.251	.105	.522	.236	1.246	.532	1.504	.652
	(.486)	(.332)	(.807)	(.565)	(1.598)	(1.029)	(1.943)	(1.289)
Total IB Courses	0	0	.002	.001	.096	.066	.093	.050
	(.018)	(.014)	(.051)	(.055)	(.714)	(.592)	(.73)	(.523)
Total Advanced (Other) Courses	.076	.096	.132	.115	.522	.27	.665	.558
	(.278)	(.306)	(.375)	(.36)	(.633)	(.515)	(.782)	(.714)
Total Dual-Credit Courses	.151	.33	.321	.668	1.579	1.939	2.156	2.354
	(.478)	(.692)	(.737)	(1.087)	(1.326)	(1.556)	(1.534)	(1.699)
Total ELA Courses	2.219	2.504	2.222	2.482	2.246	2.424	2.15	2.338
	(.671)	(1.049)	(.691)	(1.038)	(.759)	(1.025)	(.791)	(1.096)
Total Math Courses	2.03	2.074	2.058	2.078	2.051	2.063	1.759	1.815
	(.359)	(.642)	(.43)	(.652)	(.547)	(.751)	(.926)	(1.086)
Total Science Courses	1.995	1.967	2.077	2.028	2.006	1.927	1.297	1.232
	(.241)	(.48)	(.51)	(.623)	(.968)	(.917)	(1.192)	(1.204)
Total Social Studies Courses	1.926	1.871	2.075	2.077	2.336	2.342	2.184	2.235
	(.474)	(.642)	(.672)	(.797)	(.909)	(.975)	(.944	(1.056)
Total Foreign Language Courses	1.626	1.292	1.373	1.281	.621	.738	.216	.361
	(.852)	(1.021)	(.983)	(1.027)	(.959)	(1.018)	(.646)	(.830)
Total Fine Arts Courses	1.427	1.201	1.322	1.157	1.175	1.025	.994	.886
	(1.33)	(1.165)	(1.415)	(1.239)	(1.519)	(1.299)	(1.498)	(1.318)
Total Technology Courses	.18	.082	.193	.059	.181	.064	.13	.061
	(.601)	(.387)	(.667)	(.353)	(.687)	(.385)	(.589)	(.391)
Total Physical Ed. and Health Courses	1.703	1.631	1.188	1.024	.889	.767	.656	.578
	(.916)	(.997)	(1.039)	(1.038)	(1.026)	(.983)	(.916)	(.889)
Total CTE Courses	1.503	1.756	2.048	2.353	2.389	2.752	2.351	3.019
	(1.381)	(1.388)	(1.655)	(1.712)	(1.952)	(1.976)	(2.033)	(2.266)
Number of Students	97500	129471	98781	110809	97848	100028	95373	91633

Notes. Similar to Table A1 but with summary statistics further split by students' income.

Table A4: High School Average of Number of Courses Offered in 2019

Variable	Mean
Number of Courses	96.949
	(74.861)
Advanced Courses	13.285
	(15.574)
AP Courses	6.652
	(9.163)
IB Courses	.585
	(3.431)
Advanced (Other) Courses	6.048
	(5.941)
ELA Courses	11.632
	(8.074)
Advanced ELA Courses	1.915
	(2.128)
Math Courses	7.443
	(3.436)
Advanced Math Courses	2.309
	(1.813)
Science Courses	6.69
	(3.733)
Advanced Science Courses	1.438
	(2.206)
Social Studies Courses	9.048
	(4.84)
Advanced Social Studies Courses	2.16
	(2.75)
Foreign Language Courses	6.045
	(6.586)
Advanced Foreign Language Courses	1.251
	(2.325)
Fine Arts Courses	16.775
	(18.471)
Advanced Fine Arts Courses	3.375
	(4.693)
Technology Courses	1.264
	(2.144)
Advanced Technology Courses	.688
	(1.314)
Physical Ed. and Health Courses	6.258
	(4.46)
Advanced Physical Ed. and Health Courses	0
	(0)
Business Courses	0
	(0)
Advanced Business Courses	0
	(0)
CTE Courses	29.333
	(27.647)
Advanced CTE Courses	.106
	(.422)

Table A5: School Course Offering and Demographic: By Subject Area

Subject	N. Courses	N. Classrooms	N. Stud	Prop HI	N. Schls
All					
Control	4.325	16.301	43.13	.245	1138
	(3.997)	(19.082)	(62.151)	(.191)	
Treated	6.561	31.658	98.543	.26	578
	(6.867)	(35.997)	(113.048)	(.219)	
English Language Arts					
Control	5.403	24.756	74.691	.242	381
	(2.397)	(23.552)	(107.549)	(.188)	
Treated	7.564	41.719	155.881	.238	73
	(4.141)	(34.467)	(179.228)	(.194)	
Math					
Control	4.324	16.555	53.409	.212	293
	(1.388)	(14.712)	(71.242)	(.184)	
Treated	4.569	24.016	90.889	.264	81
	(1.341)	(19.073)	(83.25)	(.206)	
Science					
Control	3.183	12.754	44.377	.221	384
	(1.201)	(12.02)	(59.634)	(.17)	
Treated	3.945	25.651	110.913	.25	124
	(1.458)	(24.704)	(116.865)	(.207)	
Social Studies					
Control	5.559	21.699	64.539	.252	417
	(1.587)	(16.201)	(55.559)	(.171)	
Treated	6.294	35.667	116.983	.265	100
	(1.67)	(28.68)	(93.811)	(.203)	
Foreign Language					
Control	2.824	12.55	30.858	.269	734
	(1.252)	(9.378)	(33.751)	(.171)	
Treated	5.305	32.936	96.388	.274	128
	(6.074)	(35.05)	(103.243)	(.214)	
Fine Arts					
Control	7.786	25.802	51.967	.233	793
	(6.659)	(27.87)	(64.253)	(.168)	
Treated	13.55	53.751	129.263	.243	208
	(9.694)	(48.291)	(119.333)	(.206)	
Technology Applications					
Control	1.456	4.233	12.924	.257	743
	(.709)	(3.824)	(22.668)	(.247)	
Treated	1.712	5.917	24.353	.284	176
	(.82)	(5.624)	(31.903)	(.264)	

Notes. Table summarizes the number of subject areas in each group: treatment and control. It summarizes the number of courses, classrooms and students on average, in a given year for students who enroll in each subject area. For treated subject-areas the average is based on pre-treatment years.

Table A6: Impact of Addition AP Course on Lower-Income Students' Share of Higher-Income Classmates in all Subjects in the School

	(1)	(2)
Proportion Higher-Income Classmates in School	0.00977	0.00888
	(0.00307)	(0.00315)
Control Mean	0.110	0.110
N Clusters	1320	1320
Lower-Income Students' Avg. Proportion of Higher-Income Classmates in School	0.00928	0.00853
	(0.00302)	(0.00312)
Control Mean	0.110	0.110
N Clusters	1320	1320

The first outcome in the table captures impact of the addition of an AP course on students' share of higher-income students across courses taken that year in all subjects in the school. In the second outcome it captures the average lower-income students? share of upper-income classmates across school subjects, independent of if they take a course in the treated subject or not. The estimates are based on coefficient $beta_t$ from equation 1 for post-treatment indicator (post first AP course addition in subject) for lower-income students. Model (2) additionally controls for the number of courses offered in a given year in a school subject. Standard errors in parentheses are clustered at the school-level. Number of clusters is based on the number of schools. Control Mean is based on treated units average at $t = -1$.

Table A7: Impact of Addition AP Course on Lower-Income Students' Classroom Share Higher-Achieving (Math)

	(1)	(2)
Proportion Higher-Achieving Classmates in Subject	-0.00436	-0.00345
	(0.00609)	(0.00601)
Control Mean	0.180	0.180
N Clusters	1320	1320
Proportion Higher-Income Higher-Achieving Classmates in Subject	0.00152	0.00159
	(0.00162)	(0.00166)
Control Mean	0.0300	0.0300
N Clusters	1320	1320
Sorting by Achievement	-0.00541	-0.00544
	(0.00630)	(0.00629)
Control Mean	0.0800	0.0800
N Clusters	1320	1320

Similar to Table 6 and Table 7 but defining achievement by students' grade 8 math instead of reading test-scores. A student is defined as higher-achieving if they scored in the top 25th percentile of their grade 8 math test-score based on the distribution of student test-scores in the full sample in a given year. Sorting by income is the difference between the average share of higher-achieving students in 25th compared to the 75th percentile students based on their grade 8 math test-scores.

Table A8: Impact of Addition AP Course on Lower-Income Students' Classroom Share Higher-Income and Higher-Achieving Students [Excluding New Schools]

	(1)	(2)
Proportion Higher-Income Classmates in Subject	0.0119	0.0120
	(0.00409)	(0.00420)
Control Mean	0.120	0.120
N Clusters	994	994
Proportion Higher-Achieving Classmates in Subject	-0.00389	-0.00329
	(0.00367)	(0.00364)
Control Mean	0.160	0.160
N Clusters	994	994
Proportion Higher-Income Higher-Achieving Classmates in Subject	0.00241	0.00261
	(0.00178)	(0.00180)
Control Mean	0.0400	0.0400
N Clusters	994	994
Sorting by Income	0.00629	0.00501
	(0.00263)	(0.00286)
Control Mean	0.0310	0.0310
N Clusters	994	994
Sorting by Achievement	0.0000187	-0.00337
	(0.00590)	(0.00586)
Control Mean	0.0884	0.0884
N Clusters	994	994

Similar to Table 3 and Table 7 but limiting the sample to schools that have been open for three years or longer by 2011.

Table A9: Impact of Addition AP Course on Number of Students Enrolled in the School

	(1)	(2)
Number of Students Enrolled in School	98.10	84.09
	(20.71)	(19.35)
Control Mean	1037.5	1037.5
N Clusters	1320	1320
Number of Higher-Income Students in School	3.214	2.989
	(4.735)	(5.151)
Control Mean	121.6	121.6
N Clusters	1320	1320

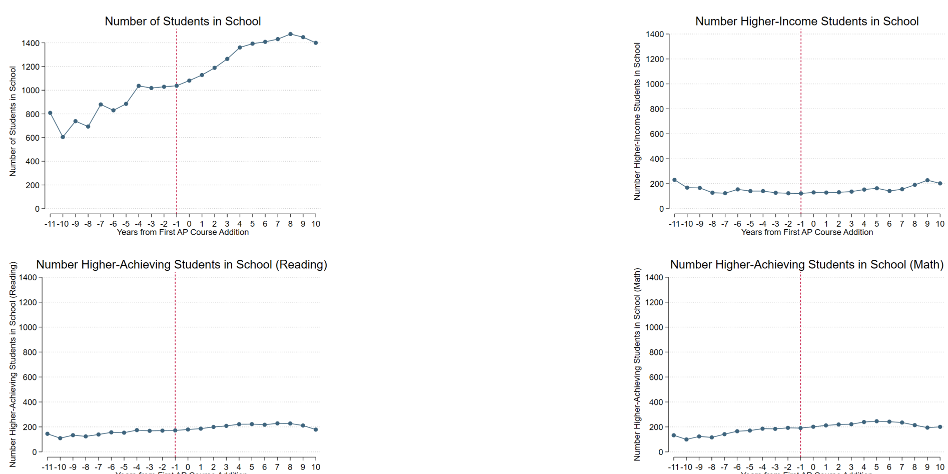
Similar to Table 8 but looking at the total number of students in the school instead of just the subject.

Table A10: Impact on Share of Higher Income Classmates, Excluding Spillover School Subjects

	(1)	(2)
Proportion Higher-Income Classmates in Subject	0.0113	0.0110
	(0.00372)	(0.00379)
Control Mean	0.110	0.110
N Clusters	1319	1319
Proportion Higher-Income Classmates in School	0.0106	0.00944
	(0.00354)	(0.00360)
Control Mean	0.110	0.110
N Clusters	1319	1319

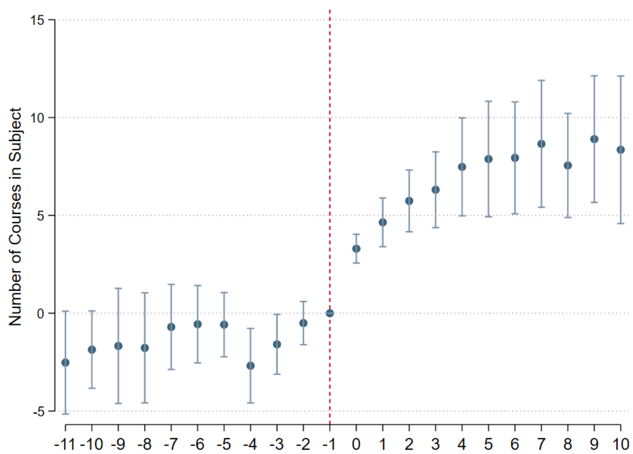
Similar to Table 3 but excluding 944 control school subjects that are in schools that add an AP course during this period in another subject and so may be more prone to spillovers from treated subjects.

Figure A1: Trends in the Number of Students Enrolled Leading Up to the Addition of an AP Course



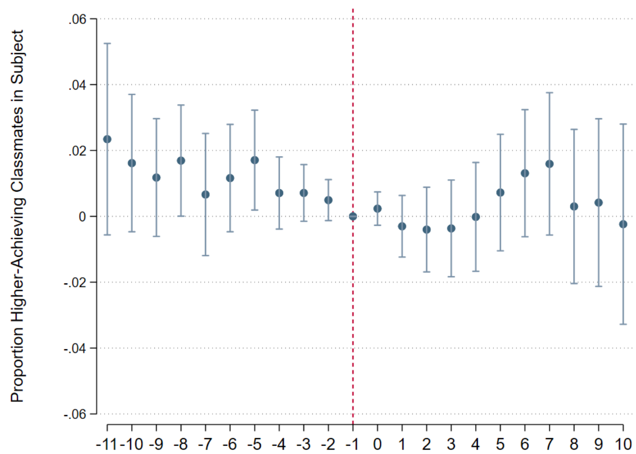
Notes: Each figure presents a change in the average number of students enrolled across all treated schools at time t where $t = 0$ is when an AP course is first added to a school subject.

Figure A2: Number of Courses in Subject Area Post Treatment

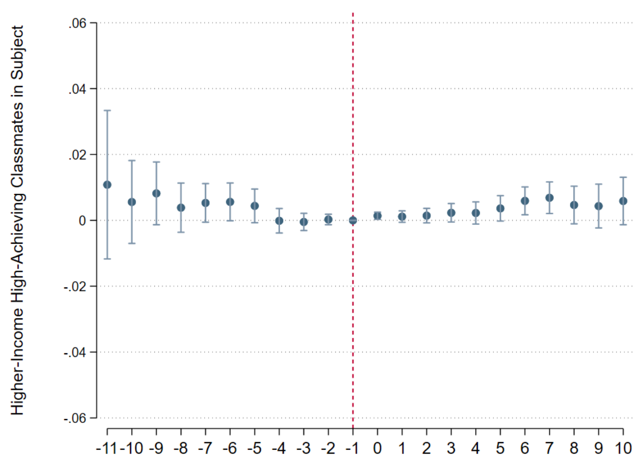


Notes: These event plot capture the impact of treatment on the number of courses in subject-area. The outcome is weighted by the number of lower-income students enrolled in the subject-area. The 95% confidence is based on the standard errors of the coefficients from the regression, clustered at the school-level. The comparison school subject areas are those never treated.

Figure A3: Impact of AP Addition on Lower-Income Students' Share of Higher-Achieving Students (Math)



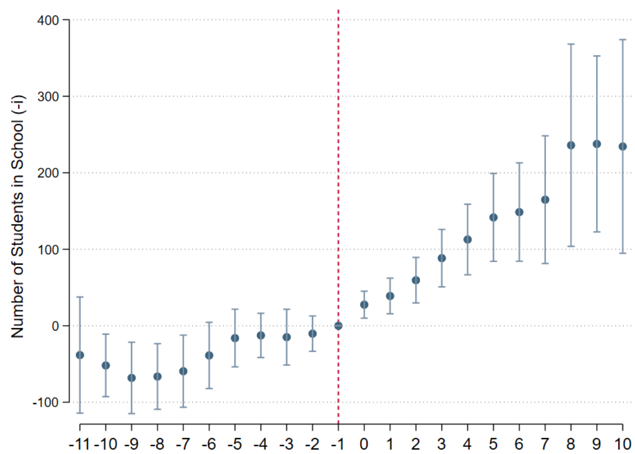
(a) Share of Higher-Achieving Students



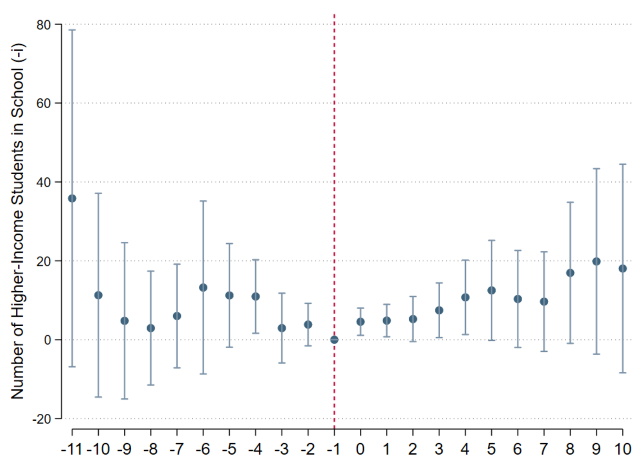
(b) Share of Higher-Income and Higher-Achieving Students

Notes: Panel (a) outcome is the average share of higher-achieving classmates for lower-income students in the subject. Panel (b) outcome is average share of higher-income and higher-achieving classmates for lower-income students in the subject. Higher-achieving students are those who scored in the top 25th percentiles of their grade 8 math test. Estimates are weighted by the number of lower-income students enrolled in the subject area in a given year. The 95% confidence is based on the standard errors of the coefficients from the regression, clustered at the school-level. The comparison school subject areas are those never treated.

Figure A4: Impact of AP Course Addition on the Number of Students Enrolled in the School



(a) Number of Students



(b) Number of Higher-Income Students

Notes: Panel (a) and (b) capture the change in the number of students prior to and after an AP course is first added to the subject. The number of students enrolled is based on the number of students enrolled in the school in a given year.